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(Continued on Inside Back Cover)

THE JOURNAL OF

EDUCATIONAL PSYCHOLOGY

Volume 47 March, 1956 Number 3

FACTOR MODELS

A. E. MAXWELL

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Psychologists in general and factor analysts in particular are glad to learn that the advent of electronic computers soon may lighten the burden of their calculations. Consequently the recent article in this journal by Wrigley and Neuhaus (*9*) on the use of an electronic computer in principal axes factor analysis (*3*) is of special interest, and is likely to be read widely. For this reason some remarks they make in their opening paragraphs—presumably by way of vindicating the principal axes method in the eyes of psychologists—should hardly be allowed to pass without comment.

TWO MODELS

The writers appear to rank the principal axes method and the centroid method of analysis together simply as different methods within a single model. "The advantage of the centroid method," they say, "has been that it has given a reasonably good approximation to a principal axes factor analysis . . . ." Now it would be fatuous at this late date to re-open the old controversy between the advocates of these two methods, but it would be careless to gloss over points of fact concerning them. Two different models are involved, the principal axes model of Pearson and Hotelling (*3*) on the one hand and the centroid method of Thurstone (*8*) on the other. Letting p stand for the number of tests and n for the size of the sample then as Kendall (*4*) puts it, the principal axes model considers n points in p dimensions, while the centroid model considers p points in n dimensions. The "loss of orthogonality" between the centroid axes to which Wrigley and Neuhaus refer is not an indication of any inferiority inherent in the centroid model, but rather a demonstration that the arithmetic techniques so far available for use with this model are mathematically inferior to those available for use with the principal axes model.

Another difference, emphasised by Bartlett (*1*), is that whereas the principal axes method is an empirical one and no psychological hypotheses are involved, the centroid method is generally employed with "communalities" in the diagonal cells of the matrix to meet the psychologist's very reasonable claim that the correlations (or covariances) between a set of tests can be described most meaningfully by a few "common" factors, together with a factor specific to each of the several tests concerned. A useful discussion of the point can be found in an article by Burt (*2*) in which alternative methods of factor analysis are considered.

Now, although the psychologist need not worry too much about the mathematical details to which reference has just been made, he should be alert lest a mathematical model incompatible with his psychological hypothesis gets sold to him on its arithmetic merits alone. He should consider whether he is justified in renouncing his birthright as a *factor* analyst at this or any price. While the writer has much appreciation of the principal axes method of "breaking down" a correlation or covariance matrix, he is not convinced that it is in general suited to the psychologist's needs.

LIMITATIONS OF THE PRINCIPAL AXES METHOD

The principal axes method too—for whatever purpose it is used—has its limitations. These have not been stated by Wrigley and Neuhaus although they are at pains to list the advantages of the method. First, the loadings obtained are not invariant under changes of scale in the variates (*4*, pp. 65–66); values got if the covariance matrix instead of the correlation matrix is employed are not proportional. Thomson (*7*, p. 335) points out that such invariance is a necessary requirement of any satisfactory factor method. Second, apart from tests for the significance of successive latent roots by Kelley, and by Bartlett (to whom they refer), the authors omit to point out that we still have insufficient knowledge about the sampling issues involved in the principal axes procedure to enable us to test the significance of loadings obtained by its use, or to test the difference between loadings obtained on different occasions. Here one must add that the latter limitation applies also to the centroid method; nor have we a valid test of the significance of centroid factors, but "simple structure," when present, is invariant under changes of scale in the variates.

ANOTHER APPROACH

In view of what has been said it would seem desirable to seek another approach which would satisfy the psychologist's needs and at the same time reasonably fulfill optimal statistical requirements. With the aid of an electronic computer the "maximum likelihood method" of Lawley (*5; 7*) is now a possible choice. Earlier doubts about its mathematical and statistical validity, except when the number of tests is very small, have not been confirmed and this method, Bartlett tells us (*1*, pp. 27–28), should meet our requirements. There may be good reasons on the programming side why it has not been chosen by Wrigley and Neuhaus, but if there are not it offers many attractions. It gives results which are invariant under changes of scale in the variates. This is indeed an advantage, for loss of information which otherwise would result from any use of standardized scores can be obviated. It provides too a valid statistical test of the number of significant factors, and last, since the sampling theory of the method is now well under way (*6*), reliable comparisons between results obtained from different studies will soon be possible. Admittedly the method, by making allowance for "specific" factors, shares the limitation of the centroid method (with communalities) that factor scores can be "estimated" only. But factor analysts seldom employ factor scores, and the need to do so will be even less when loadings can be compared by valid statistical methods and differences tested for significance.

SUMMARY

The geometrical distinction between the principal axes model and the centroid model is pointed out, and attention is drawn to the special way in which the factor analyst is wont to use the latter. Some statistical limitations are then mentioned and an alternative approach suggested.

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AMERICAN DOCTORAL DISSERTATIONS ON EDUCATIONAL PSYCHOLOGY IN FOREIGN COUNTRIES

WALTER CROSBY EELLS

Washington, D. C.

The writer has recently completed a study of some fifteen thousand doctoral dissertations in the field of education which have been accepted by American institutions of higher education. More than one thousand of these have dealt with various phases of education in foreign countries.[1]

Of the dissertations concerned with foreign education, thirty-two deal specifically with some aspect of educational psychology in various countries. These are spread over a period of seventy years, the earliest having been written at Johns Hopkins University in 1884. Interestingly enough it was written by John Dewey on the "Psychology of Kant." Almost half of them, however, have been written during the past decade.

These dissertations have been accepted at twelve American universities; Columbia leads with nine, followed by New York University with seven. Chicago is credited with four, and Johns Hopkins, Ohio State, and Southern California have two each. A half dozen other institutions have one each.

Following is a list of the dissertations on educational psychology in foreign countries with name of author, title of dissertation, institution at which it was accepted, and date of acceptance.

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[1] Titles of all dissertations in education and related fields have been examined in *Doctoral Dissertations Accepted by American Universities* (New York: H. W. Wilson Co., 1934–54, 21 vols.); *Bibliography of Research Studies in Education* (Washington: United States Office of Education, 1929–41, 13 vols., and continued in manuscript to 1952); W. S. Monroe's *Theses in Education Accepted by American Colleges and Universities* (Urbana: University of Illinois, 1920–28, 6 vols.); *American Doctoral Dissertations Printed* (Washington: Library of Congress, 1912–38, 27 vols.); and many other specialized bibliographies, catalogs, and abstracts published by individual institutions and organizations. For a brief report on the study see W. C. Eells, "American Doctoral Dissertations on Foreign Education," *Higher Education*, 12: 19–22, October 1955.

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DIFFERENCES BETWEEN GIRL AND BOY "REPEATERS"

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It has been generally assumed that the forces responsible for delinquency operate in much the same fashion for boys and for girls. True, the offenses which are entered upon the police and court records are different; girls in higher proportion are charged with incorrigibility, sex offenses, and truancy from home. This fact can easily be attributed to cultural determinants, which influence the sensitivity of the community to these types of misconduct in girls and which impel girls towards these forms of antisocial conduct in contrast to boys whose delinquencies run more to thefts and assaults.

A study, just completed, by Wattenberg and Saunders (*1*), upon factors linked to repeating among girls indicates that in some respects girls are led to repeated offenses by a somewhat different combination of forces than holds true for boys. In that study, the records of all girls contacted on charges of misconduct by the Youth Bureau of the Detroit Police Department in 1952 were compared in accordance with whether or not the girl had a previous record. All items were tabulated and the differences tested by the chi-square technique. The pattern of items where the null hypothesis could be rejected at the one per cent level of confidence was then compared with a similar testing of differences between repeaters and first offenders among boys.

As contrasted to boys, repeating among girls was linked to a narrow range of factors. The girls appeared to be more influenced by present relationships within the home and particularly by the mother-daughter relationship. The largest clusters of items associated with female repeating related to friction with parents and with school. The only direct socio-economic factor positively linked to repeating was size of home. In this case it was found that the relatively few girls living in units with two or more rooms per person were likely to be repeaters, if they came to police attention at all.

These findings raised a question as to the extent to which there might be a distinctively feminine pattern not only of offenses but

of associated variables. To test this out it was decided to undertake a comparison between all girl repeaters and all boy repeaters who came to the attention of the Youth Bureau of the Detroit Police Department in 1952.[1] Although there are obvious limitations upon data collected by the police, there are compensating advantages. One very important fact is that records made at this point in the "processing" of a "delinquent" eliminate the biasing influence of the selective factors which determine official action at the Juvenile Court level. For instance, in handling the repeaters with whom we are concerned, the police invoked Court action for 58.5 per cent of the boys but only 35.2 per cent of the girls. By contrast, dispositions involving referral to various social agencies were made for 13.8 per cent of the boys and 30.0 per cent of the girls. Clearly, a comparison of girls with boys declared officially delinquent by juvenile courts measures the selective factors as much as any basic sex differences between the two groups. Even the comparison at the police level is affected by selective factors related to attitudes resulting in complaints.

The procedure used in the present study was simple. The records on file for 1952 were examined and those for youngsters who had previous offenses were segregated. In the processing of each complaint, the Youth Bureau of the Detroit Police Department as a matter of routine undertakes an investigation which includes interviews with youngsters and parents, and visits to the homes. The information gathered is recorded on a "history sheet," and then transferred to IBM cards. For 1952, these permitted sixty-one tabulations related to the young person, his home, school, neighborhood, leisure, and offenses.

For 1952, there were totals of one thousand, four hundred and eighty-three boy repeaters and four hundred and twenty-seven girl repeaters. When the chi-square test was applied to the sixty-one tabulations, it was found that for fifty-one the null hypothesis could be rejected at the one per cent level of confidence, and for an additional four, at the two per cent level. Clearly, there are substantial differences between boy and girl repeaters. These are summarized in Table I.

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[1] For aid in undertaking this study and making police records available, the author wishes to express appreciation to the following members of the Youth Bureau: Senior Inspector Sanford Shoults, Inspector Ralph Baker, Lieutenant Francis Davey, Sergeant Elizabeth Grindle, and Sergeant Mervin Roberts.

TABLE I—ITEMS LINKED TO SEX AMONG JUVENILE REPEATERS

Item	Categories High for Girls	Categories High for Boys	P<
Years in Detroit	0; 1	Life	0.01
Size of dwelling unit	More than 1.5 rooms per person	Less than 1 room per person	0.01
Type of dwelling unit	Rooming house; apartment	Single family homes	0.01
Condition of dwelling	Good	Average; needs minor repairs	0.01
Rating of neighborhood	Above average; below average	Average	0.01
Type of land usage	Mixed residential and commercial	Residential	0.01
Parent employed	Mother; neither	Father only	0.02
Income of parents	Regular low	Adequate	0.01
Recreational equipment of youngster	Less than playmates	Same as playmates	0.01
Distance from nearest recreational facility	20 blocks or more	5 blocks or less	0.01
Condition of interior of dwelling	Meticulous	Average; slovenly	0.01
Step-parents	Yes	—	0.01
Marital status of parents	Divorced	Home intact	0.01
Family quarreling	Frequent	Little or none	0.01
Youngster living with:	Stepfather and mother; boarding home	Both own parents	0.01
Father at home	Nights	Never	0.01
Mother at home	Never	All the time	0.01
Parents' attitude toward youngster	Punitive; rejecting; over-protective	Forgiving	0.01
Youngster's expressed attitude toward parents	Likes mother and doesn't mention father; dislikes mother and doesn't mention father; dislikes father and doesn't mention mother	Likes both parents	0.01
Youngster's expressed attitude toward home	Dislikes	Likes	0.01
Attitude toward mother	Dislikes	Likes	0.01

TABLE I—*Cont.*

Item	Categories High for Girls	Categories High for Boys	P<
Attitude toward father	Not mentioned	Likes	0.01
Attitude toward stepmother	Dislikes	Likes	0.01
Participation of parents in youngster's activities	Regular; occasional	None	0.01
Can youngster drive family car?	No	Yes	0.01
Does youngster complain of being "picked on"?	Yes, by mother; by father	No	0.01
Do parents approve of dating?	No	Yes	0.01
Alcoholism in home	Yes, leading to family discord	None; Yes, leading to abuse of youngster	0.01
Chores around home	Some	Few; none	0.01
Parents' attitudes toward police	Indifferent; antagonistic; trying to alibi selves	Coöperative	0.01
Church attendance	Regular; less than once a month	Less than once a week; never	0.02
Attitude of youngster to adult neighbors	Indifferent	Friendly	0.01
Attitude toward school	Dislikes	Likes	0.01
School grades	Good	—	0.01
Grade in school	Ninth	Special class	0.01
Attitude to teachers	No comment	Friendly	0.01
Relations with classmates	Quarrels	Friendly	0.01
Member of:	School clubs	Boy Scouts; YMCA	0.01
Peer group relations	"Lone wolf"	Member of regular play group; gang	0.01
Nature of peer group activities	Orderly	Theft	0.01
Favorite sport	Dancing; not stated	Games	0.01
Favorite entertainment	Dancing; not stated	Shows	0.01
Physical development	Large for age	Small for age	0.02
Sexual development	Mature	—	0.01
Appearance	Neat and clean	—	0.01
"Mentality"	Above average	—	0.02

TABLE I.—*Cont.*

Item	Categories High for Girls	Categories High for Boys	P<
Age	13; 14; 15	12 or under; 16	0.01
"Attitude" toward officer	"Anti-social"		0.01
"Type"	Quarrelsome	Mischievous	0.01
Paid employment	None	Part-time; full-time	0.01
Type of employment	—	Labor; newspaper	0.01
Disposition of earnings	—	Part to parents	0.01
Offences (At age 12 or under)	Incorrigible; truant from home	Breaking and entering; malicious destruction of property	0.01
Offenses (At age 13 or 14)	Sex offenses; incorrigible; truant from home	Breaking and entering; larceny; auto theft	0.01
Offenses (At age 15 or 16)	Sex offenses; disorderly conduct; incorrigible; truant from home	Assaults; breaking and entering; larceny; and auto theft	
Police disposition of case	Released; referred to social agency	Complaint filed; referred to probation officer	0.01

It will aid interpretation of that table to recognize some characteristics of the chi-square test when applied to large groups. First, the chi-square calculation is based on numbers, rather than on intensity. It is a comparison of groups, not of individual qualities. Thus, the table cannot be taken to show that the average girl repeater hates her mother and the average boy loves his. Rather, among girls a larger number expressed dislike. More important, the chi-square is raised by items where there is a difference, even though only a small minority is involved. For instance, it would be a mistake to conclude that girl repeaters are transients and boys, native Detroiters. On this item, to be specific, 3.3 per cent of the girl repeaters but only 0.8 per cent of the boys had been living in the city for less than a year. Altogether, 82.0 per cent of the boys and 73.8 per cent of the girls had lived in Detroit all their lives. This attribute of the chi-square also permits measurement of the tendency for a group to show variability. Thus, on ratings of neighborhood quality, the girls showed greater dispersion; more

of them came from areas classed as "above average" and "below average." With the resultant cautions in mind, let us now compare the girls as a group with the boys as a group.

On socio-economic indices, the girls showed a wider range. More of them came from transient families living under conditions of relative poverty. However, the larger population also included a minority coming from economically advantaged homes, as attested by dwellings with 1.5 or more rooms per person. Although there was a similar minority among boys, for girl repeaters this minority was larger in terms of percentages. (For girls, eleven per cent came from homes having 2, 2.5, or 3 rooms per person; for boys the percentage was 6.9.)

Disruption of the home affected proportionately more girl repeaters than boy repeaters. For instance, more girls had divorced parents, lived with a step-parent, or were in boarding homes. More girls had working mothers, or, if both parents were home, reported severe quarreling.

Open friction at home was more prevalent for girls. This was evidenced by the fact that at all ages girls were frequently charged with "incorrigibility," with the charge for this offense originating with parents or step-parents. Another indication is that among youngsters having step-mothers, 18.4 per cent of the boys and 59.1 per cent of the girls expressed dislike. The attitude toward their own mothers showed the same trend, but to a lesser degree. Interestingly, attitude toward father or step-father was not as clear-cut. Girls, more often than boys, complained of being picked on. When interviewed by the police, more of the girls' parents fell into the minorities displaying hostile, rejecting or over-protective attitudes.

On one index of family functioning, the girls showed a favorable picture; more came from homes where parents participated regularly in their child's activities. Also, girls tended to have more chores to hold them in the house. This "closeness" may have been a disadvantage if the time spent in parent-child activity was typified by tension.

More of the girl repeaters showed lack of friendliness with other adults. More were indifferent to adult neighbors and disliked school. Interestingly, despite this, more of the girls earned good grades in school.

Relationship with peers showed interesting differences. The boy

repeaters were more often reported to be active in games, members of gangs, and getting in trouble with their gangs. More of the girls quarreled with their peers, and were "lone wolves." They belonged in greater number to sedentary school clubs, as opposed to the active Boy Scout and YMCA programs which attracted the boys. The livelier interest in sex was indicated by the high rating many girls gave to dancing. (It was checked as a favorite sport or hobby by 27.9 per cent of the girls but only 2.3 per cent of the boys.)

Aside from sex activity, more of the girls followed conventional behavior patterns as attested by regular church attendance, good school grades, membership in orderly peer groups, performing chores at home, and presenting a neat and clean appearance. In terms of attitudes, as these were rated by the police, however, more girl repeaters presented a picture of being quarrelsome, antagonistic, and resistant.

Another difference between the sexes results from differences in employment possibilities. Fewer girls obtain paid work.

This study verified the often-reported contrast in offense patterns. The boys tended to concentrate in the theft groupings and, among the older boys, to be charged more often with assaults. The younger girls were charged frequently with incorrigibility and running away from home. Above the age of thirteen, sex charges were often reported. As previously reported, police dispositions for boys made greater use of official court facilities; for girls, of referral to social agencies or release to parents.

CASE STUDIES

The distinctive quality of the factors surrounding girls' delinquency tended to be verified by case studies, of which three will be reported.

Gladys Nelson[2] had a record of five "arrests," two of them on complaint of her mother. The first, at sixteen, was an aftermath of a drinking party. At first she denied the charge of committing an immoral act, but when medical examination revealed a recently ruptured hymen, she confessed, saying she had not wanted to be called chicken. Later offenses involved drinking, beating up a younger girl in a fight over a boy friend, and being found in a stolen car.

[2] To protect the privacy of individuals, all names and other identifying data are fictionalized.

The Nelson home is torn by parental dissension. Mr. Nelson drinks heavily, quarrels with his wife, and picks on Gladys. Although occupying the same domicile, the parents are technically separated. Mrs. Nelson has started divorce proceedings.

Mrs. Nelson uses Gladys as a maid, and complains the girl does not do her share of the household duties. Although the mother makes much of wanting to understand the girl, she nevertheless is trying to get her into a boarding home.

The Nelsons live in a five-room flat in a stable, middle-class, all-white neighborhood. Besides the parents and Gladys, there is a younger brother. During interviews, Gladys gives the impression of a sophisticated young lady, who hates her father.

The second case, illustrative of "incorrigible" charges, concerns Helen Olson, fourteen, who was picked up three times on complaint of her mother. Mrs. Olson had a long list of misdemeanors to report: Helen kept late hours, truanted from school, even when her mother brought her to the building. Mrs. Olson also accused her daughter of immorality, which the girl denied.

The Olson family consists of the mother, daughter, and the mother's boy friend, all of whom occupy a two-room apartment in a working class district. The mother divorced Helen's father, remarried, and divorced the step-father.

Although Helen gets good grades in school, she does not want to attend. The family has moved so often that Helen is behind in her school work. When interviewed by the police, she cried and begged for another chance. However, three weeks later she was again truanting. She and a girl friend "walked around" during school hours. Helen said she was afraid of losing this friend, and the two had agreed to skip school every day.

The mother tends to treat Helen as though the girl is a nuisance. Mrs. Olson seems to be preoccupied with her own problems. After lodging complaints against her daughter, she was nervous and belligerent with the police.

Rarely would a similar situation be presented in the case of a boy. The truancy charge did not originate with the school. No other of Helen's actions would have drawn a police charge. Certainly, one never hears of a man living out of wedlock and asking the police to take action against a son for allegedly engaging in sexual intercourse.

A rather different picture is presented by Ida Phillips, fifteen,

whose record included three arrests for larceny and one escape from a detention home. In this case the family was intact. Mr. and Mrs. Phillips, with their three children, occupied a seven-room flat in an average, solidly Negro part of the city.

Interviews with mother and daughter tended to bring out a sham surface of affection. Mrs. Phillips at times took the tack of accusing the police of trying to "get" the girl. Then, later, she wanted to have the girl placed in a private institution for wayward girls.

In the day-to-day operation of the home, Ida was left a great deal to herself, Mrs. Phillips led an active social life centering in club activities. The father was a wishy-washy nonentity whom the mother kept out of the case.

In many respects, the pattern followed by Ida Phillips could be duplicated by many boy repeaters.

DISCUSSION

Although there is undoubtedly much overlapping between the sexes on factors found in repeaters, there is also evidence that a distinctively feminine pattern occurs in enough cases to affect statistical indices. This pattern tends to be brought to a focus in the fact that a parent, usually the mother, is the complainant. This act often results from a long history of tension. Whereas boys tend to escape their homes by engaging actively in sports and gang activities, some of the girl repeaters get caught up in squabbles. As a consequence a number become police cases by reason of acts which would be ignored in the case of boys.

There has often been an assumption that the comparatively large percentage of girls charged with sex-linked activities and with incorrigibility was due to the fact that our culture reflects a double standard of morality. While this may account for some of the difference, this study would suggest that the process whereby the charge is made deserves attention.

When compared with boy repeaters, many of the girls in our sample seemed to be more conforming to acceptable behavior standards. The outstanding segment where they suffered by comparison was their more open hostility to the adults in their lives. Yet, as illustrated in the cases of Gladys Nelson and Helen Olson, this hostility emerges as a product of a nasty, personal feud within the home.

In the light of the above, one may well wonder whether the ques-

tion to be studied in the case of at least some of these girls should not be phrased, "What factors lead parents to invoke legal machinery to settle quarrels with their daughters?" or "What leads a girl to clash with her mother so much that the police are called in?" rather than "What are the causes of female delinquency?"

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THE GENERAL ABILITY TO JUDGE SOCIOMETRIC STATUS: ELEMENTARY STUDENT TEACHERS' SOCIOMETRIC PERCEPTIONS OF CLASSMATES AND PUPILS[1]

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It has been definitely established that individuals can judge the sociometric status of group members with better than chance success, and that there are large variations among individuals in their ability to make such judgments (*1*, *5*, *7*, *8*, *9*). These two conclusions seem to lead to the question raised in the present study. Is there a general ability to judge the sociometric status of group members? If it is established that this ability is general, it will then be possible to determine the personality correlates of this ability, the extent to which it can be improved by training, and how this ability is related to other types of social perception.

In addition to its theoretical significance, it is of practical import to know whether the ability to judge sociometric status is general. The relationship an individual establishes with his peer group is related to his ability to judge accurately the sociometric status of the group's members (*7*). Other investigators (*4*) have also found a relationship between the accuracy of teachers' social perceptions and the effectiveness of their relationships with students. Thus, it appears that an individual who is a good judge of others will find it easier to make social adjustments. If the ability to perceive sociometric status is general, then some basis will be provided for predicting the same individual's adjustments to different groups. This would be especially valuable in the case of teachers, who must make adjustments to their colleagues (peer group) as well as to their pupils (non-peer group). With the first group it is a matter of good staff relationships that contribute to the smooth functioning of the school. With the latter group it is not only the development of good personal relationships with pupils, but also the ability to assist pupils with their social adjustments. The effectiveness of

[1] This research was supported, in part, by a grant from the Bureau of Educational Research, College of Education, University of Illinois.

teachers in this regard is partly dependent upon their ability to perceive accurately the relative sociometric status of their pupils.

The specific problem under investigation is that of determining whether elementary student teachers who are good judges of the sociometric status of the members of their own *peer group* (classmates) are also good judges of the sociometric status of the members of a *non-peer group* (pupils they are teaching). A significant relationship between the accuracy of their judgments in these two situations would indicate the presence of a general ability to judge sociometric status.

METHOD OF INVESTIGATION

Population. The population consisted of one hundred and seventy-six student teachers and seven hundred and seventy-six pupils. The student teachers were enrolled in fourteen sections of the course, Technique of Teaching in the Elementary School, and were concurrently doing their student teaching at the elementary level. The fourteen sections ranged in size from eleven to fifteen with an average of approximately thirteen students per section. The seven hundred and seventy-six pupils were in the third, fourth, fifth, and sixth grades of the Champaign-Urbana Public Schools.[2] There were thirty classroom groups represented. Class size ranged from seventeen to thirty-six with an average of twenty-six pupils per class.

Procedure. A sociometric test was administered to the student teachers in all fourteen sections of the course, Technique of Teaching in the Elementary School, three months after the beginning of the course. Since the class procedure consisted mainly of informal discussion, it was felt that the students were well enough acquainted with each other to make valid sociometric choices. The sociometric form consisted of an alphabetical list of the students in each section. On this form each student was asked to rank the students in his section in the order in which he would prefer them as teaching companions. This ranking was done from the extremes of the distribution toward the center. Thus, each student indicated the classmate he preferred *most* as a teaching companion, then the

[2] Grateful acknowledgment is extended to Dr. Fred Barnes and the supervising teachers of the Elementary Education Division, College of Education, University of Illinois; to Miss Margaret Henderson, Director of Elementary Education, Champaign Public Schools; to Mr. Alvin King, Director of Elementary Education, Urbana Public Schools; and to the principals and teachers participating in the study, for their fine coöperation.

student he preferred *least* as a teaching companion, the one he preferred *next most, next least,* etc., until all of his classmates had been ranked. The relative sociometric status of the students in each section was obtained later by averaging the rank-order preferences of each individual.

After the sociometric form had been completed, the students in each section were asked to judge the relative acceptability of their classmates as teaching companions. This was done on another alphabetical list of the class members. Before making their judgments, it was explained to the students that a compilation of the sociometric preferences would indicate the relative acceptance of each student, by the group, as teaching companion. They were then asked to predict this rank order. Again the ranking was done from the extremes of the distribution toward the center. These procedures provided the data for determining the accuracy of the one hundred and seventy-six student teachers' *peer group judgments.*

A selected number of the student teachers was requested to make judgments also of the relative sociometric status of the pupils they were teaching. Originally, all of the students doing their practice teaching at the third-, fourth-, fifth-, and sixth-grade levels were to be selected for participation in this part of the study. Of the eighty-seven student teachers in this category, thirty-nine were eliminated because the schools in which they were teaching found it impossible to participate in the study. Another eighteen were eliminated because they had already seen the results of a sociometric test administered to their pupils. Thus, data on the accuracy of student teachers' *non-peer group judgments* were obtained for thirty of the original subjects. Before making their judgments the student teachers read the following statement:

> The pupils in your class will be asked to name the five children with whom they would *most prefer to work*. The total number of choices each child receives will indicate his (her) acceptability to his (her) classmates as *work companion*. Some children will be highly accepted, receiving many choices; some will remain unchosen; the remainder will fall in between these extremes. Consequently, the children can be ranked in the order of their relative acceptability as work companion from the most accepted to the least accepted.
>
> We are interested in determining the extent to which student teachers can judge the relative acceptability of each child to his (her) classmates as work companion. As you know, boys and girls at the later elementary level seldom choose members of the opposite sex as companions. Therefore, we are asking you to judge the boys and girls in your class separately.

Following this statement, each student teacher was requested to rank all of the boys in his class in the order in which he thought the boys would be accepted by their classmates as work companion. The same procedure was followed in obtaining judgments of the relative sociometric status of the girls in class. This ranking, like that in the peer groups, was done from the extremes of the distribution toward the center. Since the student teachers had devoted half of each day for approximately three months to their student teaching, it was felt that they knew their pupils well enough to make such judgments.

The sociometric test, described above, was administered to the pupils in each of the thirty public-school classrooms by the regular teacher. The use of five choices was prompted by the greater stability of sociometric results (*10*, *12*) with this number of choices. The relative sociometric status of the pupils in each class was determined later by totaling the number of choices each pupil received. All choices were given a value of one regardless of level of choice, since it has been shown (*10*) that the arbitrary weighting of choices does not increase the stability of sociometric results.

ANALYSIS OF DATA AND RESULTS

Accuracy of Peer Group Judgments. The accuracy of each student teacher's judgments of his classmates was determined by correlating his prediction of the relative sociometric status of the class members with the results of the sociometric choosing. The resulting correlation coefficients represent the *accuracy scores for each student teacher's peer group judgments.* The means and standard deviations of these accuracy scores, for each of the fourteen sections, are presented in Table I. Although the mean accuracy scores range from 0.37 to 0.68, the *t*-test has shown *no* significant differences among the means of the various sections. The standard deviations for each section, however, indicate considerable variation in judgment accuracy among the individuals within each section. Since Bender and Hastorf (*2*) have suggested the possibility that such variations in accuracy may be accounted for by different degrees of "projection" on the part of the individual aided or hindered by the amount of similarity present between the individuals and the persons judged, it was decided to investigate the possible influence of this factor on the accuracy scores.

In order to do this, two scores, suggested by the work of Gage and

TABLE I—MEAN CORRELATIONAL SCORES AND STANDARD DEVIATIONS REPRESENTING THE ACCURACY OF ELEMENTARY STUDENT TEACHERS' JUDGMENTS OF THE SOCIOMETRIC STATUS OF THEIR CLASSMATES (N = 176)

Class Section	Fall, 1953			Spring, 1954			Fall, 1954		
	N	*M*	S.D.	*N*	*M*	S.D.	*N*	*M*	S.D.
A	12	0.40	0.16	13	0.51	0.14	12	0.54	0.17
B	11	0.64	0.20	13	0.53	0.21	12	0.37	0.18
C	11	0.50	0.17	14	0.59	0.18	13	0.41	0.25
D	12	0.68	0.18	13	0.57	0.14	15	0.66	0.16
E	12	0.43	0.22	13	0.64	0.21			

Exline (*3*), were determined for each individual. One was a similarity score, and the other an assumed similarity score. The *similarity score* was obtained by correlating each individual's sociometric preferences toward his classmates with the group members' relative sociometric status. Thus, the resulting correlation coefficients indicated the degree to which each individual's sociometric preferences were similar to the sociometric preferences of the group. The *assumed similarity score* was obtained by correlating each individual's sociometric preferences toward his classmates with his judgments of their sociometric status. Although this correlational score indicated the extent to which the individual's preferences toward others is related to his judgments of others, it cannot be assumed that it represents only "projection" on the part of the individual. If similarity scores are high, then high assumed similarity scores on the part of an individual might, to a large extent, represent insight into the attitudes and feelings of the group members. The present data do not make clear to what extent the assumed similarity scores are based on insight and to what extent they represent projection, but there is some evidence that both are probably present.

The interrelatedness of the similarity scores, the assumed similarity scores, and the accuracy scores, for each individual, may be seen in Figure 1. Since the three types of scores are correlational scores, the connecting lines represent the correlations between the three sets of responses.

The similarity scores, in the fourteen sections, ranged from a mean correlation of 0.36 to 0.63 with a median of 0.53. The assumed

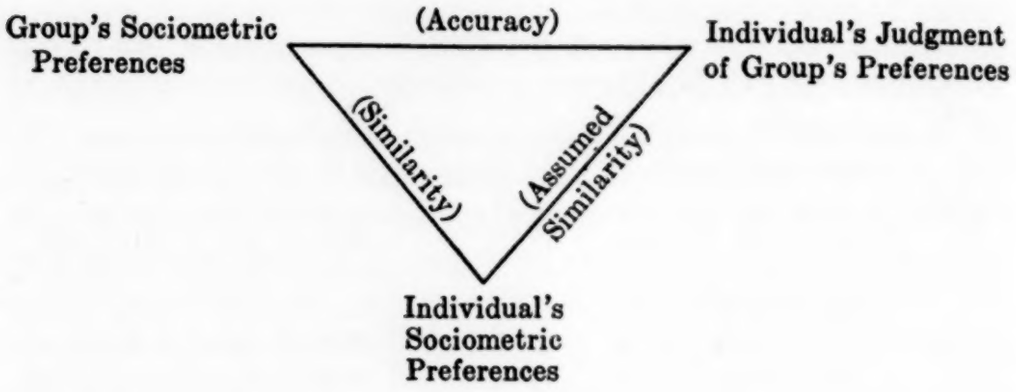

FIGURE 1

similarity scores ranged from a mean correlation of 0.58 to 0.74 with a median of 0.67. An inspection of the twenty-eight correlational scores in the fourteen sections revealed that in every section the mean assumed similarity score was greater than the mean similarity score. This indicates that individuals assumed greater similarity between their sociometric preferences and the preferences of the group than actually existed. This general tendency of individuals to overestimate the amount of similarity present would tend to indicate that "projection" was present in the assumed similarity scores. Since the correlational accuracy scores, the similarity scores, and the assumed similarity scores are interrelated through a variable common to each, this overestimation of similarity would tend to reduce the mean accuracy scores found in the fourteen sections. However, this "projection factor" may still inflate individual accuracy scores where similarity happened to be high.

In order to determine the possible influence of "projection" on individual accuracy scores, it was decided to compare the assumed similarity scores and the similarity scores for the two most accurate and the two least accurate judges in each of the fourteen sections. Before making this comparison, all of the scores were converted to *T*-scores. The twenty-eight *most accurate* judges had a mean accuracy score of 62 (*T*-scores), a mean assumed similarity score of 55, and a mean similarity score of 55. The twenty-eight *least accurate* judges had a mean accuracy score of 34, a mean assumed similarity score of 46, and a mean similarity score of 46. The *t*-test has shown that the most accurate group had significantly higher (0.01 level) assumed similarity and similarity scores. Thus, it is possible that the accuracy scores of the most accurate group were inflated to some extent by a combination of "projection" and higher similarity scores. However, as pointed out previously, it is also possible that the most accurate judges were more accurate in perceiving the

amount of similarity present and their assumed similarity scores, thus, represent insight into the feelings of the group rather than "projection" of their own sociometric preferences. Nevertheless, the large difference in accuracy scores between the most accurate and the least accurate groups could not be accounted for entirely by "projection," even if this were known to be a dominant factor in the assumed similarity scores. It should be pointed out, however, that the possible contamination of these accuracy scores by a "projection factor" would, in all probability, lower the amount of generality found in the accuracy of the judgments over peer groups and non-peer groups.

Accuracy of Non-peer Group Judgments. The accuracy of each of the thirty student teachers' judgments of their pupils was determined by correlating their predictions of the pupils' relative sociometric status with the results of the sociometric test. Since boys and girls were judged separately, there were two accuracy scores for each teacher. Their accuracy in judging the sociometric status of boys was represented by a mean correlational score of 0.59 with a standard deviation of 0.19. Their correlational accuracy scores for girls had a mean of 0.61 and a standard deviation of 0.20. The lack of a significant difference in the accuracy of student teachers' judgments of the sociometric status of boys and girls verifies similar results found with experienced teachers (*8*).

The total accuracy of each student teacher's judgments was obtained by averaging his correlational accuracy scores for boys and girls. The method of Z-transformation was used in the averaging. The resulting correlation coefficients represent the *accuracy scores for each student teacher's non-peer group judgments.* These correlational accuracy scores had a mean of 0.60 and a standard deviation of 0.12. This mean accuracy score is similar to that found in several other investigations (*5*, *8*, *9*) concerned with experienced teachers' sociometric perceptions of their pupils.

Although studies (*5*, *8*) have reported no relationship between class size and the accuracy of teachers' sociometric perceptions, it was decided to check the influence of this variable in the present study. The resulting correlation of 0.11 between class size and the student teachers' accuracy scores was not significantly different from zero, verifying the previous findings. A similar lack of relationship was found between the spread of pupils' sociometric status scores and the accuracy of the student teachers' judgments. The resulting correlation was 0.09. This finding is not in agreement with other investigations (*6*, *9*) which reported a slight, but significant, positive relationship between the two variables. The lack of rela-

tionship in this study can probably be accounted for by the restricted variation of the standard deviations among classes. These scores had a mean of 3.3 and a standard deviation of 0.6, indicating that the spread of sociometric scores was fairly similar in all thirty classes of pupils.

Since two previous investigations (*1*, *11*) have shown a slight increase in the accuracy of teachers' sociometric perceptions with older age groups, the influence of this variable on the student teachers' accuracy scores was also investigated. An analysis of the data revealed that the mean grade level of the six most accurate student teachers was 4.3; for the six student teachers with average accuracy it was 4.6; and for the six least accurate student teachers it was 4.3. Both the most and the least accurate student teachers had judged the pupils in four fourth-grade classes and two fifth-grade classes.

It is apparent that the accuracy of the student teachers' non-peer group judgments was not influenced by the number of pupils they had in class, by the spread of sociometric status scores among their pupils, nor by the grade level of the pupils they were teaching.

Generality of Judgment Accuracy. It will be recalled that there were thirty student teachers who made judgments of the sociometric status of their classmates (peer group judgments) as well as judgments of the sociometric status of their pupils (non-peer group judgments). Thus, the generality of their judgment accuracy could be determined by relating the accuracy of the peer group judgments to the accuracy of their non-peer group judgments. However, before correlating these two sets of accuracy scores, it was necessary to convert then to *T*-scores.

The student teachers' peer group judgments had a mean *T*-score of 50 with a standard deviation of 10.4. Although these accuracy scores were obtained from fourteen different peer groups, they indicate a normal distribution of accuracy scores. When these accuracy scores were correlated with the student teachers' accuracy scores for non-peer group judgments, a correlation of 0.49 was obtained. This coefficient was found to be significant beyond the one per cent level. Thus, *these data are consistent with the hypothesis that the ability to judge the sociometric status of others is general.*

Although the size of the correlation coefficient tends to indicate that specific abilities are also present to a large degree, it is suspected that uncontrolled variables reduced the amount of generality reported. Since the peer group judgments were obtained from

fourteen different college classes and the non-peer group judgments from thirty different groups of pupils, there is a strong likelihood that situational factors influenced the judgment accuracy scores. This probability is supported by a previous study (*9*) which has shown that some groups are more difficult to judge than others, due to variations in the complexity of the social structure. Had it been possible to have all of the student teachers judge the same peer group and the same non-peer group it is felt that the index of generality would have been higher. Nevertheless, this finding that there is a general ability to judge sociometric status indicates the desirability of further explorations in the area.

IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The findings indicate that some student teachers are generally good at perceiving the sociometric status of group members while others are generally poor. Thus, this study should make a contribution to the future selection and training of teachers as well as add to the theory of sociometric perception. However, there are several questions which should be answered before these results will find much practical application.

The extent to which accuracy of sociometric perception is related to other forms of social perception should be explored. In the classroom, teachers are expected to judge the knowledge, attitudes, interests, and a host of other characteristics about their pupils. Although it is easier to obtain objective evidence in some of these areas than in others, a major share of teachers' daily responses are probably based on judgments of their pupils. The appropriateness of teachers' responses is determined in part by the accuracy of their perceptions. Thus, it seems important to determine whether there is a general ability to judge the characteristics of pupils.

A second area that needs exploration is that of the extent to which the ability to judge others is subject to training. Teacher training institutions now proceed on the assumption that teachers can be trained to understand their pupils. However, a previous study (*12*) has shown no relationship between accuracy of sociometric perception and amount of college training in education or psychology. Social-perception skills may be found to be unresponsive to training, or it may be discovered that a special type of training is needed. Nevertheless, further research should be directed toward an evaluation of the trainability of these skills.

In addition to the above studies, it would seem important to investigate the specific rôle that social perception plays in teaching effectiveness. It may turn out to be a basic condition for effective teaching or merely a facilitating factor. However, the practical import of the findings would tend to indicate that research in this area is urgently needed.

SUMMARY AND CONCLUSIONS

This study was concerned with the extent to which the judgment of sociometric status is a general ability. The accuracy of elementary student-teachers' judgments of the sociometric status of *peer group members* (classmates) was correlated with the accuracy of their judgments of the sociometric status of *non-peer group members* (pupils they were teaching). An analysis and comparison of the data revealed the following findings.

(1) The accuracy scores of one hundred and seventy-six student teachers' judgments of the sociometric status of their classmates (*peer group judgments*) ranged from a mean correlation of 0.37 to 0.68 with a median correlation of 0.54, in fourteen college classes. However, these differences in means among the groups were *not* significant, due to the large variations in judgment accuracy among individuals within each group. In all fourteen college classes the student teachers assumed greater similarity between their sociometric preferences and the sociometric preferences of the group than actually existed. This "projection factor" tended to lower their judgment accuracy.

(2) The accuracy scores of thirty student teachers' judgments of the sociometric status of their pupils (*non-peer group judgments*) attained a mean correlation of 0.60 with a standard deviation of 0.12. There was *no* difference in the accuracy with which student teachers judged the sociometric status of boys and girls. There was also *no* relationship between the student teachers' accuracy of judging pupils' sociometric status and the following variables: number of pupils in class; spread of sociometric status scores; and grade-level of the pupils judged.

(3) The *T*-scores representing accuracy of *peer group judgments*, for the thirty teachers participating in both phases of the study, had a mean of 50 and a standard deviation of 10.4, indicating a fairly normal distribution of scores. When these accuracy scores were correlated with the accuracy scores for *non-peer group judg-*

ments, a correlation coefficient of 0.49 was obtained. This coefficient was found to be significant beyond the one per cent level, *indicating the presence of a general ability to judge the sociometric status of others.*

A discussion of the results led to the suggestion that further investigation should be directed toward determining the relationship between sociometric perception and other forms of social perception, the trainability of social-perception skills, and the specific rôle that social perception plays in teaching effectiveness.

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THE RELATION OF INTELLIGENCE AND PHYSICAL MATURITY TO SOCIAL STATUS OF CHILDREN[1]

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There have been a number of studies attempting to get at the relation of IQ to social status. Results have been very conflicting. Several studies have reported no significant relation. A large number of studies have found a significant but low positive relationship between the two, using the correlation technique.

It appears significant that most of the studies reporting an insignificant or at best, a low positive relationship, have used the correlation method, which of course assumes a rectilinear relationship. Now, if intelligence and social status are related, but not in a rectilinear manner, correlation might not detect it. If we divide the data into halves or thirds and compare means, we have a much better chance of discovering a relationship which is curvilinear.

In a relevant study, Bonney (*1*) obtained a low insignificant correlation between IQ and social status with second grade children. However when she then took the upper and lower quartiles on social status scores, she found only one person in the upper quartile with an IQ below 90 while there were sixteen in this classification in the lower quartile.

The author suggests that intelligence is important in regard to social status only to a point; that only in those individuals who show considerable deviation from the norm of the group in IQ, will there be a relation to social status.

The same questions arise in connection with research on the relation of physical maturity to social status in pre-adolescent children. Jones and Bayley (*2*) took two extreme groups of male preadolescents in physical maturity, using skeletal age as the criterion

[1] Special acknowledgment is due to Dr. Donald M. Johnson, Professor of Psychology, Michigan State University, for his help in the preparation of this paper. The author is also indebted to Dr. Charles DeLong, Assistant Professor of Education, Michigan State University, who made available for this study the records of the Child Development Laboratory, Michigan State University.

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and compared them on reputation tests which were administered to the classes from which the sample was drawn. They found the advanced maturity group tended to be more popular while the low maturity group tended to be rejected.

The present study is designed to see whether individuals who deviate considerably from the group in either IQ or physical maturity also show a deviation in social status.

SAMPLE

This sample was made up of three classes of children, one class from each of the third, fourth, and fifth grades from a public school in a small suburban town. These children are both rural and urban, from predominately middle-income homes. Total number of children making up the study was ninety-seven, forty-eight girls and forty-nine boys.

PROCEDURE

Kuhlman-Anderson IQ scores were used for the intelligence measurements. Selecting some measure of physical maturity presented more difficulty. Jones and Bayley selected their high and low maturity groups using skeletal age as the criterion. They then found that the mean heights of these groups were far apart. It was decided to use height as the criterion of maturity in our study, bearing in mind the grossness of differentiation with use of such a single criterion. The Cunningham Social Distance Scale (*3*) was used to obtain a measure of social status for the individual. On this scale each pupil prints the name of each other pupil in the class in one of five categories assumed to be on a continuum from positive to negative. In computing the social status score of a child, the categories are weighted 5, 4, 3, 2, 1 from most positive (I would like him for a very close friend) to most negative (Wish he weren't in our room).

PRESENTATION OF RESULTS

Mean IQ's, heights, and social status scores are presented in Table I with the standard deviations.

Because of variations in height between boys and girls and between grades, *T* scores were computed for each group for height, IQ and social status. It was necessary to select some figure as a cut-off point to obtain a sample of children showing considerable deviation from the mean. Solely because of the necessity of obtaining

TABLE I—MEAN IQ, HEIGHT, AND SOCIAL STATUS

	Kuhlman-Anderson IQ's	Height in Inches		Social Status on Social Distance Scale
		Boys	Girls	
3rd Grade mean	102.57	51.20	51.62	3.55
SD	9.56	2.50	2.17	0.647
4th Grade mean	91.93	53.85	53.91	3.39
SD	11.07	2.49	1.89	0.660
5th Grade mean	94.20	55.99	57.58	3.73
SD	12.75	2.42	2.86	0.410

TABLE II—SOCIAL STATUS SCORES FOR HIGH, AVERAGE AND LOW IQ GROUPS

	High IQ				Average IQ				Low IQ			
	No.	K-A IQ	Height	Social status	No.	K-A IQ	Height	Social Status	No.	K-A IQ	Height	Social status
High maturity	4	64.2	64.0	60.5	10	50.7	66.1	51.8	3	37.4	64.4	42.3
Average maturity	11	63.0	50.0	59.7	36	51.2	51.0	52.2	10	36.2	49.6	33.5
Low maturity	4	62.9	36.7	50.5	11	50.7	37.3	54.4	8	33.6	37.1	39.1
Total	19	63.2	50.1	58.7	57	51.0	51.0	52.6	21	35.2	47.0	36.9

a fair-sized sample, a standard deviation of 0.84 was selected. There was no other basis for choosing this figure. In future studies with large samples it might be feasible to obtain finer breakdowns with more categories, thus permitting a more detailed analysis.

Thus with our distribution in T scores, all individuals with T scores in IQ or height of 58.4 or above were placed in the high IQ or advanced maturity category while those with a T score of 41.6 or below were placed in the low IQ or low maturity category. Those children with T scores between 58.4 and 41.6 were placed in the average category.

In Table II the social status scores in T scores are presented with breakdowns into high, average and low IQ categories and high, average and low maturity categories. The total mean social status scores for the high, average and low IQ groups are also presented

TABLE III—SOCIAL STATUS SCORES FOR HIGH, AVERAGE AND LOW MATURITY GROUPS

High Maturity				Average Maturity				Low Maturity			
No.	K-A IQ	Height	Social status	No.	K-A IQ	Height	Social status	No.	K-A IQ	Height	Social status
17	51.5	65.3	52.2	57	50.8	50.6	50.4	23	46.9	37.1	48.4

in Table II. The total mean social status scores for high, average and low maturity groups are presented in Table III.

None of the differences between mean social status scores for high, average, and low maturity groups are significant, either when taken as a total or when taken with the average IQ groups. In fact when the social status scores for the high, average and low maturity groups are compared in the average IQ category it will be seen that they are all extremely close to the mean of 50.

The total mean social status score for the high IQ group is 58.7, for the average IQ group, 52.6, and for the low IQ group, 36.9. All of these differences are significant beyond the 0.01 level by the *T* test.

DISCUSSION OF RESULTS

We found that there were no significant differences on social status between high, average and low maturity groups. This means one of two things: either our use of height as a measure of physical maturity was not a good one, or physical maturity is not related to social status at this grade level. Because of the rather close correspondence of height at the pre-adolescent level to other measures of physical maturity we might have used, we would expect to have obtained a difference in our distribution if the relationship here were a gross one. However further studies will have to be made using other criteria of maturity before a definite conclusion can be drawn.

In our IQ groups the differences on social status between our high and average groups and between our average and low groups were highly significant. In our sample then, the extreme deviates in IQ do show a deviation in social status. The high IQ group was 6.1 above the average group in social status, while the average IQ group is 15.7 points above the low IQ group. Thus the difference

between average and low is more than two and a half times as great as the difference between average and high. This would point toward the decremental effect on social status of a low IQ being greater than the incremental effect of a high IQ. Illustrating a more striking contrast, there is a difference of 21.8 points on the *T* scale for social status between high and low IQ groups.

Analyzing the data in another manner we find in the high IQ group only three children out of nineteen below the mean on social status. In the low IQ group there is only one child out of twenty-one above the mean on social status. Now in our average IQ group there were several children who went as high on social status as the highest of the high IQ group and several who went as low as the lowest of the low IQ group.

This may be the reason so many investigators have obtained a negligible correlation between IQ and social status. The relationship does not appear to be a rectilinear one. Rather it may prove to be an exponential function: that IQ is important only up to a point. We have evidence for this in the extremely low social status of our low IQ group.

CONCLUSIONS

(1) Physical maturity as measured by height shows no relation to social status in pre-adolescent children.

(2) Children who show considerable deviation in IQ from the group also deviate in social status in the same direction as the IQ deviation.

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AN INVESTIGATION OF THE RELATIONSHIP BETWEEN PERSONALITY AND VOCATIONAL INTEREST

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A phase of the mushrooming guidance and testing movement that, according to all available evidence, has suffered in comparison with others is that which would *relate scientifically* the various factors of human development measured in today's guidance testing programs. Too many generalities characterize the thinking and too many broad assumptions have been made by counselors as well as test makers, at least in dealing with personality, interests, and aptitudes. Much work has been done by pioneers in the testing field to relate intelligence to achievement, and with well-known success. But, in spite of the fact that the measurement of interests is thirty-five years old, very little experimentation has been done to correlate interests with aptitudes (7, pp. 379–99) and even less to relate personality to interest. It is with this last aspect that this study has concerned itself.

It was the purpose of this investigation to determine what personality patterns, if any, are peculiar to those interested in certain occupations as evidenced by the results of administering to high school seniors standardized tests of vocational interest and personality. In effect, are those persons interested in becoming teachers, for example, high in social skills and community relations and perhaps low in nervous symptoms? Are those interested in entering the acting profession, for example, high in self-reliance and freedom from withdrawing tendencies and possibly low in family relations? Or, in terms of the layman, are actors "high-strung"? Are mechanics "easygoing"? etc. If definite patterns were to appear, the way would then be clear for other researchers to demonstrate the possible uses to which such knowledge could be put.

Much care and thought go into the making of modern standardized tests and an equal amount of care should be employed in their use. Counselors should be equipped, with the help of researchers, with the most successful and practical methods of approach once they have the results of a testing program in their hands. In spite

of how well-meaning their efforts may be, gross injustices to our children may be perpetrated unless those in charge of guiding them know how to relate significantly the various scraps of information they may learn about them. The present a priori basis for explaining such relationships as may exist can and should be replaced by a scientific approach.

Perhaps the well-chosen words of Cattell best describe the current status of the question:

"It is a sad illustration of the meager harvest accruing to pure science from comparatively heavy expenditures on applied science that, in spite of the enormous attention vouchsafed in the last forty years to the psychology of vocational guidance, we still have no figures even for the *means* of occupations with regard to the principal personality factors. . . ." (*1*, p. 418).

Comparatively little research is available which can be considered truly conclusive in relating personality to vocational interest. In previous studies the number of cases involved and the correlation coefficients obtained have not been high in most instances (seldom over ± 0.40); and often having to do with the masculinity and femininity of interests, results are usually couched in clinical terms unfamiliar to the average teacher or guidance worker. A good many investigators have been unable to conclude much more than that personality maladjustment is most commonly associated with arts and social service and that adjustment is highly correlated with interest in the mechanical field of endeavor. Most important to this study, very little work has been done with the instruments involved.

METHODS

The group involved in the study consisted of three hundred and twenty-four seniors taking a course in social studies at El Monte Union High School in El Monte, California. The median Language I.Q. for the group was 105; the median Non-Language I.Q., 102, indicating that the group was a very normal one as far as mental maturity was concerned. The group was almost entirely of the Caucasian race and divided evenly between males (50.5 per cent) and females (49.5 per cent). Ninety-one per cent of the population was from either the West or the Midwest. A student questionnaire was completed by each person, giving the author, in addition to the

above information, an idea of the socio-economic status and expressed interests of the group.

The following procedure was followed in administering standardized paper-and-pencil tests in personality and interests to the experimental group and in correlating results.

(1) First, students for whom scores on the California Test of Mental Maturity, Advanced, 1946 Edition (*6*) were available (so that Language and Non-Language I.Q.'s could be used to describe more adequately the various interest groups and predict their chances for success in their chosen profession) were given the California Test of Personality, Secondary, Form A (*8*).

(2) Then the group took the Occupational Interest Inventory, Intermediate, Form A (*3*).

(3) Using the seventieth percentile on the Occupational Interest Inventory as a criterion (cut-off point), which is selective enough to indicate true peaks of interest out of the six major occupational fields, data for the students of both sexes who met that criterion (composite norms were used) were selected for further testing and analysis.

(4) Then two hundred and twenty-nine students who met the above criterion were given the Vocational Interest Analyses (*5*) which corresponded to interests registering at the seventieth percentile or above on the Occupational Interest Inventory. Since most students had at least two peak interests, the basic data were nearly doubled. It should be noted here that the Vocational Interest Analyses are a new, six-fold analytical extension of the Occupational Interest Inventory.

(5) Of the four hundred and twenty Vocational Interest Analyses taken, seventy-nine of them were in the Personal-Social field; eighty-two, Natural; sixty-eight, Mechanical; ninety-three, Business; ninety-four, Arts; and only four, Sciences. Since each of the six Analyses is subdivided into six more specific occupational fields a criterion had to be set up which would indicate true interest in them on the part of the examinee as it was for these thirty-six subgroups that mean personality profiles were to be computed. Also correlations between interest scores and personality scores were to be computed on them. It was decided to use only those cases the scores of which were above the midpoint of the range as a criterion to select those who would appear to be truly interested in any of

the thirty-six specific types of activities on the Vocational Interest Analyses. A cut-off point of 22 was used rather than 20, since the standard error of measurement on nearly all of the Vocational Interest Analyses sub-groups lies between two and three score points, and a score of 22 or better is thus more likely to be genuinely above the midpoint of the range. Cases which did not meet this criterion were discarded from the study. In all, nine hundred and thirty-four sub-scores were available for further study at this point.

(6) Sufficient interest was shown in twenty-six of the thirty-six interest groups, and *N*'s varied from sixty-seven (Social Service) to eighteen (Bench Work and Bench Crafts) with an average of thirty-six. Results for the entire Sciences Analysis were omitted since an almost complete lack of interest was shown for any occupation involving scientific work by the group.

(7) The results of the above testing program were punched on Hollerith cards, sorted, and tabulated to form scatter diagrams preliminary to the hand computation of correlations, means, and standard errors of measurement.

(8) Scores of the twenty-six interest groups on the Vocational Interest Analyses were correlated by means of an adaptation of the tetrachoric method with scores on the twelve components, Self, Social, and Total Adjustment on the California Test of Personality. This involved 390 (26 × 15) correlations in all, using the formula:

$$r_t = \text{Cos}\,\pi \frac{\sqrt{bc}}{\sqrt{ad} + \sqrt{bc}}$$

In each correlation a scatter diagram was formed first as for a Pearson *r*. Then, to obtain a true median split, the two class intervals in which the medians fell were ruled off, thus presenting a 3 × 3 scatter plot, in each cell of which the frequencies were totaled. The frequencies in the median intervals were then distributed proportionally to the four corner cells. At this point, the formula above was applied.

It should be noted here that the formula was developed by Pearson, himself, and he reported that the mean error of this method of estimating *r* is less than four per cent (*4*, p. 370). This has been experimentally verified by others and it is rare that an error greater than 0.05 is encountered, when care is taken to ensure median dichotomy on both axes. The smoothing procedure described above performs the additional function of avoiding the great effect that

chance fluctuation exerts when N is small, as it is in some of the correlations involved in this study.

As a test of significance, standard errors of measurement were computed for the three hundred and ninety correlations, using the formula: $SE_{r_{t_o}} = \frac{1.5708}{\sqrt{N}}$, which is derived from Pearson's formula for computing the probable error of a tetrachoric r $\left(PE_{r_{t_o}} = \frac{0.6475\,\pi}{2\sqrt{N}}\right)$ when the dichotomic lines are at the medians in both arrays (*4*, p. 372). To determine the level of significance from these SE's, the r's were divided by SE_r and the results looked up in Fisher's table of the value of t at the various levels of significance (*2*, p. 330).

In the case of the smaller samples ($N < 60$), the formula $t = \frac{\sqrt{r^2(N-2)}}{1-r^2}$ was used and the result multiplied by $\frac{\pi}{2}$ to provide a more rigorous test (*4*, p. 154). For example, a minimum value of a tetrachoric r significant at the ten per cent level is given by $r = \frac{\frac{\pi}{2}t_{10}}{\sqrt{N-2+t^2_{10}}}$ in which t_{10} (the value of t significant at the ten per cent level) was obtained by simply referring to Fisher's table.

(9) Median scores on the California Test of Personality were computed for the twenty-six interest groups and then translated into percentiles. These were plotted on profile sheets for the personality test. The middle fifty per cent of each group was also plotted on the profiles to show the scatter of the scores.

RESULTS

Among the results of the correlation study, the nine relationships shown in Table I were found to be significant at the five per cent level of confidence.

The fifteen correlations in Table II proved to be significant at the ten per cent level of confidence.

There were no correlations significant at the one per cent level of confidence; however, the author feels that the correlations in Tables I and II may very definitely indicate a trend.

The plotting of median personality profiles for the twenty-six interest groups brought to light some interesting results and they

TABLE I.—CORRELATIONS BETWEEN COMPONENTS ON THE CALIFORNIA TEST OF PERSONALITY AND INTEREST GROUPS ON THE VOCATIONAL INTEREST ANALYSES*

Component on the C. T. P.	Interest Group on the V. I. A.	*N*	Correlation Coefficient
School relations	Social service	67	0.44
School relations	Health and medical service	22	0.67
Social adjustment	Health and medical service	22	0.66
Total adjustment	Health and medical service	22	0.64
Community relations	Fish, game, and domestic fowl	39	0.51
Sense of personal freedom	Designing	29	0.63
Social skills	Bookkeeping and accounting	54	0.46
Self reliance	Management and control	36	0.52
Social standards	Drama and radio	51	0.44

* Significant at the 5 per cent level of confidence.

TABLE II.—CORRELATIONS BETWEEN COMPONENTS ON THE CALIFORNIA TEST OF PERSONALITY AND INTEREST GROUPS ON THE VOCATIONAL INTEREST ANALYSES*

Component on the C. T. P.	Interest Group on the V. I. A.	*N*	Correlation Coefficient
Self adjustment	Social service	67	0.33
Social standards	Social service	67	0.34
Total adjustment	Social service	67	0.32
Feelings of belonging	Health and medical service	22	0.60
Family relations	Fish, game, and domestic fowl	39	0.46
School relations	Fish, game, and domestic fowl	39	0.43
Self reliance	Maintenance and repairing	38	−0.49
School relations	Maintenance and repairing	38	−0.42
Total adjustment	Maintenance and repairing	38	−0.45
Feelings of belonging	Machine operation and tending	32	−0.46
Sense of personal freedom	Bookkeeping and accounting	54	−0.39
Social standards	Management and control	36	0.50
Sense of personal worth	Art crafts	26	0.51
Social standards	Decorating and landscape	45	0.38
School relations	Literary activities	27	0.52

* Significant at the 10 per cent level of confidence.

are described below. A tabulation of the best adjusted and most poorly adjusted groups on Self, Social, and Total Adjustment on the California Test of Personality was made and may be seen in Table III.

TABLE III.—BEST ADJUSTED AND MOST POORLY ADJUSTED INTEREST GROUPS ON SELF, SOCIAL, AND TOTAL ADJUSTMENT ON THE CALIFORNIA TEST OF PERSONALITY

Self Adjustment				Social Adjustment				Total Adjustment			
Best adjusted interest groups	Percentile	Most poorly adjusted interest groups	Percentile	Best adjusted interest groups	Percentile	Most poorly adjusted interest groups	Percentile	Best adjusted interest groups	Percentile	Most poorly adjusted interest groups	Percentile
Teaching and related activities	60	Gardening and greenhouse care	40	Teaching and related activities	75	Maintenance and repairing	40	Teaching and related activities	65	Gardening and greenhouse care	40
Lumbering and forestry	60	Painting and drawing	40	Health and medical service	65	Shipping and distribution	40	Health and medical service	65	Fish, game, and domestic fowl	40
Bench work and bench crafts	60	Machine operation and tending	35	Social service	60	Machine operation and tending	35	Drama and radio	65	Maintenance and repairing	40
Drama and radio	60			General and crop farming	60			Social service	60	Management and control	40
Music	60	Shipping and distribution	35	Gardening and greenhouse care	60	Management and control	35	Construction	60	Machine operation and tending	35
		Bookkeeping and accounting	35	Art crafts	60			Music	60		
				Drama and radio	60						
				Literary activities	60						
				Music	60						

Table IV represents percentiles on the California Test of Personality which were so unusually low as to make them worthy of note.

The groups were most consistently high on Social Standards and Freedom from Anti-Social Tendencies.

Considering the five general interest fields under which the twenty-six sub-areas just analyzed are grouped, it was found that they were adjusted on Self, Social, and Total Adjustment on the California Test of Personality as shown in Table V.

As to the median intelligence quotients for the twenty-six groups, it is interesting to note that the general fields having the highest Language and Non-Language I.Q.'s were the two which were the

TABLE IV.—UNUSUALLY LOW PERCENTILES ON CALIFORNIA TEST OF PERSONALITY COMPONENTS EARNED BY CERTAIN INTEREST GROUPS ON VOCATIONAL INTEREST ANALYSES

Interest Group	C. T. P. Component	Percentile
Fish, game, and domestic fowl	Community relations	20
Maintenance and repairing	Social skills	20
Machine operation and tending	Social skills	20
Machine operation and tending	Community relations	20
Construction	Community relations	20
Shipping and distribution	Family relations	20
Management and control	Social skills	20
Gardening and greenhouse care	Freedom from withdrawing tendencies	25
Machine operation and tending	Freedom from withdrawing tendencies	25
Machine operation and tending	School relations	25

TABLE V.—ORDER OF ADJUSTMENT OF FIVE GENERAL INTEREST FIELDS ON SELF, SOCIAL, AND TOTAL ADJUSTMENT ON CALIFORNIA TEST OF PERSONALITY

Order of Adjustment	Self Adjustment	Social Adjustment	Total Adjustment
1	Personal-social	Personal-social	Personal-social
2	The arts	The arts	The arts
3	Natural	Mechanical	Natural
4	Mechanical	Business	Mechanical
5	Business	Natural	Business

best adjusted on the personality test: Personal-Social and The Arts.

The small amount of variance among the median I.Q.'s found in this study (which, incidentally were corrected to the 1951 norms), and the very fact that they are medians and do not disclose the extremes, makes prediction (especially on the basis of the small *N*'s), even with what we now know of intelligence requirements for success in given vocations, too hazardous a process at this stage.

CONCLUSIONS

On the basis of the foregoing results, the following conclusions as to the relationship between personality and vocational interest seem reasonable.

(1) Though high in a few but slight in a majority of instances (which is in line with previous research in this field), there are definitely measurable relationships between personality and vocational interest.

(2) Consequently, it would seem good psychological procedure to include the use of personality inventories as a must in guidance testing programs, and at as early a stage in an individual's career as is practicable, a view which some of today's counselors do not yet hold. Obviously, the earlier undesirable personality patterns are discovered and diagnosed, the sooner will guidance people be able to provide the therapy necessary for proper adjustment of those who evidence an interest in entering a certain profession. Certainly, in the face of the evidence, guidance personnel can no longer ignore the necessity of investigating further the relationship between personality and vocational interest to replace current a priori bases for prediction in this area.

(3) In view of the fact that results in this study indicated that those individuals interested in the general fields of Personal-Social and The Arts were the best adjusted as to personality and those interested in the Mechanical field the most poorly adjusted (which is in more or less direct contrast to the findings of previous studies), it would seem wise to examine more closely the findings of studies of this nature as well as intensifying research in the field to provide conclusive evidence as to the direction in which the truth lies.

(4) For the individuals involved in this study at least and possibly for other individuals, the California Test of Personality is especially effective as an indicator of personality trends or patterns

for those interested in Social Service, Health and Medical Service, Fish, Game, and Domestic Fowl, and Maintenance and Repairing, since these groups involved the greatest number of statistically significant correlations.

(5) Although it is commendable as an ultimate aim, on the basis of the results obtained in the present study it can only be concluded that, although the temptation is great, it would be too hazardous a course to use median personality profiles for the twenty-six interest groups as "templates" to judge future individuals expressing an interest in any of these twenty-six sub-areas of vocational activity. Counselors, themselves, however, can aid researchers in verifying such profiles in no small degree by accumulating evidence that those who express interest in certain occupations have certain personality patterns which are peculiar to all the others who profess interest in those occupations (if such is the case, as it appears to be). Thereby small N's will become large N's, skewed distributions will become relatively normal in comparison, and low correlations may in time become high ones, thus providing overwhelming evidence of relationships.

RECOMMENDATIONS

Since studies such as this involve certain necessary limitations, recommendations for further study become more or less self-evident. The more potentially fruitful of these recommendations in the author's opinion are listed here.

(1) Studies similar in nature to this one should be made with groups much greater in number. The number of cases should be extended to include students from all over the country, of all races, and socio-economic and intelligence levels. In addition to gaining for the researcher a more representative sampling of the nation's youth, increased numbers will enable him to analyze the personality of individuals interested in all of the thirty-six vocational subgroups, not merely twenty-six as in this study. Too, the age range might well be extended to include junior high school students, on the one hand, and adults (graduates) on the other; this, in spite of the present evidence of stability of interests. Obviously, the value of any statistical technique is enhanced by larger numbers of cases.

(2) Studies could be made to great profit with other standardized measuring devices than the ones involved in this and previous studies. By simply consulting yearbooks of test materials, the student

of educational psychology will see that there remain many tests which may be used in studies relating personality to vocational interest; and, although the task may appear gargantuan, it remains for someone to correlate results of analagous studies (but using different testing instruments) and emerge with the invaluable "general" pattern that could be used by guidance workers and counselors in guiding tomorrow's youth.

(3) As has been pointed out by other investigators and will be emphasized here, the relationship of personality not only to interests but to aptitudes and success on the job is needed and may well prove a fruitful field for future study. Since interest does not necessarily insure success and aptitude is not necessarily a correlate of interest, investigation of the one must be enforced by investigation of the others. The resulting continuum, were such research completed, would undoubtedly be invaluable to the guidance counselor, who could scientifically counsel an individual no matter whether his vocational strengths and weaknesses be in the interest, aptitude, or success-on-the job stage.

(4) Future research in this field should take into account much more than did this study the environmental (or hereditary) influences on vocational choices. The extent to which such things as transfer of interests from parent to child take place should be considered so that groups under consideration may be more adequately described. To insist that all interests are a function of personality unequivocally would be as big a mistake as to ignore its rôle in interests. The guidance worker is also obviously interested in such questions as: Is the student taking course work commensurate with his interests or is he enrolled in classes because his parents wish it? Does he feel that, in light of circumstances, he will be able to follow the career in which he is most interested? These problems have been considered independently by others, but are posed here to suggest that future investigators of the relationship between personality and vocational interest describe better their populations and the incidental influences on vocational choice.

(5) Last, but perhaps most important, it is recommended that the cause-effect relationship (which was beyond the scope of this study) be examined exhaustively through factor analysis so that hypotheses can be supplanted by facts and by action on the part of guidance people to improve or mould personality, on the one hand, and provide opportunities to work at jobs that will constitute ther-

apy on the other. Little, if any, evidence along this line is available at the present time to those charged with the responsibility of successfully guiding our children in the choice of their life's work. It is entirely possible that he who chooses to dedicate himself to such research may well earn the gratitude of countless personnel managers for reducing employee turnover to a minimum.

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EDUCATIONAL THEORY AND THE PSYCHOLOGY OF LEARNING[1]

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As background for this paper I should like to quote an illustration given by Guthrie (*1*) on the first page of this chapter in the National Society Yearbook on "The Psychology of Learning." It consists of a description of a day in school as told by a boy in the elementary grades. His account is as follows:

"We have a man teacher. He doesn't get mad much. We talk a lot. If somebody throws a pen or stuff like that, he puts you out in the hall. We have 20 words for spelling. We write them on Monday and Wednesday and Friday, but it only counts on Wednesday and Friday. Then we have social science. It's really history, but he likes fancy names for things. Then we study geography and then mathematics—really arithmetic, you know. He gives us some fancy doo-jigs to work with. About two boys get their seats changed if they've been poking somebody. Then the teacher gives us exams and stuff and we have recess—ten minutes—not much time for doing things. We mostly play marbles. Then the bell rings and we go in and the teacher talks a lot about notices. Then the music class. The music teacher talks a lot. We don't sing much. Sometimes we sing a review song, but mostly the teacher talks. Then we have reading. The teacher is nuts about ancient literature. Then we check our books at the book table. They have about 200 books. Some of them are good and some are corny. We have shop, too; make things. There's a jig saw and a lathe and a sander and a printing press. We use all those things. I made a record case and a broom holder and a box."

From the point of view of a boy, school consists of a summation of days and years of experiences such as those described. Certainly his account seems trivial and unimpressive as a sample of this multibillion-dollar enterprise we call Education. From the point of view of the psychologist and the educator, the behaviors described by the boy are likely to be evaluated in terms of the pattern of changes they produce in the boy as a human organism, in terms of the particular knowledge and skills that are developed, and in terms of the general intellectual and emotional habits that result. The educator will be concerned with the question of whether such

[1] Presidential address read at the meeting of the Educational Psychology Division of the American Psychological Association at the Annual Convention in San Francisco, September 10, 1955.

behaviors as those described by the boy will produce the kind of outcomes expected by society, and, if so, with the theoretical explanation of such outcomes. The psychologist will be concerned with a theory of learning that will explain the changes produced in the boy, although he will probably be less concerned about what outcomes are expected by society. The main concern of this paper is how a theory of education as expressed by the educator is related to a theory of learning as formulated by the psychologist.

In general, theories of education have been formulated quite independently of theories of learning and, likewise, learning theories have been set up by psychologists who are often quite innocent of an intimate knowledge of what goes on within schools. One of the main concerns of the Educational Psychology Division of the American Psychological Association, so it seems to me, should be to bring together the learning theory of the psychologists and the educational theory of the school.

At one of the section meetings of the American Association for the Advancement of Science, a competent educational psychologist made the statement that learning theory had no value for teachers in the classroom. Yet, since teaching implies learning, how can it be that a serious study of the theory of how one learns can have no value for the teacher? One is tempted to explain this opinion as due to the failure of the theorist to illustrate and to verify his theory in terms of the kinds of learning that are carried on in schools. For example, the classical experiment in conditioning is simple and clear in showing how substitute stimuli will produce the flow of saliva in the dog. One can illustrate the process of conditioning quite easily with young children by stimulating a fear response of running away from an assortment of stimuli. Here we have a constant, original response of secreting saliva, or of running, as a result of a variety of stimulations. However, the school is not overly interested in original responses. How shall the teacher use the process of conditioning to elicit all the varied kinds of responses that are the desired outcomes of education? When close to the level of native response, the conditioning theory is easily illustrated. But how shall we tell the algebra teacher to use it in teaching a ninth-grade pupil to square the binomial "x + y"? Guthrie, in his text on the "Psychology of Learning" (*2*) asks the question, "What does the principle of conditioning mean in the form of practical advice?" He answers with an illustration on the

same page as follows: "If we wish to teach a dog to come when he is called, our method will be to get him to come by hook or crook. There are no rules for this except what we know of dogs in general." Is the teacher of algebra to be offered nothing better than a "by hook or crook" method? Or, is an unvarying production of a correct response all that is expected from the study of algebra? Further on, Guthrie states ". . . the student officer is cautioned never to give a command that he is not confident will be obeyed. If the command is followed by acts other than those commanded, the command becomes merely a cue for disobedience and the officer loses his authority." Is the teacher then never to ask a question until he is confident it will be answered correctly? And by what occult power will he know when the time is ripe? One may at least have some sympathy for the teacher who fails to find learning theory helpful. But in all truth, there is an obligation on the part of someone to make it helpful. It makes no sense when a serious study of learning and a serious attempt to teach find no common ground.

Any educational situation involves a purpose or objective, a content to be learned (a curriculum), and a process of learning. The over-all purpose or objective, what we are trying to do, is expressed as theory of education. The *process* of changing behavior in accordance with educational theory is expressed as the psychology of learning. Between these two is the content to be learned, whether substantive subject-matter or behavior traits. The thesis of this paper is that if the psychology of learning is to be effective in the schools, it must focus its interests and design its experiments with awareness of the theory of education that is currently accepted by the society in which the schools operate. As theory of education is modified, the direction of psychological study must be changed if its results are to influence educational practice. This is no different in the areas of education and psychology than in other areas. The current interest in nuclear physics has for a decade produced a new focus of attention for scientists of many fields. The movement from old issues to new characterizes a live science. Research in the field of educational psychology should reflect the movement of educational theory. In the 1920's, research on drill in arithmetic was in harmony with educational theory; in 1955, such studies would have far less significance because the purpose and theory of teaching arithmetic have undergone marked change.

The ultimate objective, of course, is not merely to relate research to currently accepted educational theory, but rather, to do the kind of research that will help to formulate an educational theory that is *valid*.

I should like to illustrate this relationship between educational theory and the psychology of learning by reference to only two of the several theories of education which might be described. During the last century, and in some places still, education was considered as basically the acquisition of knowledge. The inscription, "Knowledge is Power," was found on many school buildings. Passing on the intellectual heritage of the race was considered the primary purpose of the school. Acquirement of knowledge, with some attendant skills, was the basic aim. Prior to the Civil War, the accumulation of knowledge was not so great as to constitute any considerable burden to the learner. Then the situation changed. Particularly in the field of science, a great expansion began. This increase in subject-matter to be learned was met by devising the elective system. This gave rise to the problem of what knowledge is of most worth and resulted in a fight for time among the different branches of the curriculum. By the twentieth century the situation began to be serious, particularly in the secondary school and junior college. Pupil programs, which at first were made up of a large common group of required subjects plus a few electives, began to show a progressively smaller group of required subjects and an increase in the electives. By the 1920's it became clear that any attempt to cover the field of essential knowledge was hopeless by the required and elective system. A new venture into general education, by means of survey courses, was tried, and now such courses are a part of the program at the junior college level in many institutions. Back of all these changes was the basic question, "What is an education?" As long as it is defined as mastery of the body of knowledge, it must necessarily expand, although the individual learner's capacity to learn has undergone no corresponding change. The elective program was characterized as a specialization in depth in a few areas, with chasms of ignorance between. After thirty years of experimenting with survey courses, they are often subject to the charge of specialization in another axis; namely, specialization in superficialities. But if in theory a good education is defined in terms of knowledge and skill, what other alternatives

are there, particularly in the face of a certain increase in the rate of accumulation of knowledge.

If some modification of the foregoing picture is accepted as a theory of education, then what type of psychological research in learning will likely follow? With so much to be learned, one would expect emphasis on the psychology of memory and retention. Problems of length and distribution of practice periods, whole and part methods of memorizing, prerequisites affecting the order in which different subject-matters should be learned would seem important. Major concern would be centered on subject-matter to be learned, rather than changes in the learner. One can find many specifics to illustrate both this theory of education and the kinds of learning studies mentioned.

However, one might conceive of a second very different theory of education. Rather than define a good education in terms of the knowledge and skills possessed, one might think of it in terms of certain changes brought about in the learner, by means of which he would develop abilities enabling him to respond successfully to the diverse and unpredictable situations that life will bring. Advocates of such a view would readily admit the necessity of a fairly large amount of basic knowledge and skill. Certainly they would not make a virtue of ignorance. But rather than conceive of education as an encyclopedic coverage of knowledge, they would deal with the heritage of knowledge in a highly selective way. They would probably agree on the necessity of certain knowledge and skill, for example, ability to read, knowing how to spell, knowing number facts and relations, and the skill of writing, plus other less well agreed upon additions. However, they would stress such general outcomes as learning how to think, learning how to use a library; how to design and carry out an experiment; how to meet people; how to control the emotions; how to adjust to frustrations. In the literature, the outcomes just enumerated are often dealt with in a very nebulous manner. However, if a person holding some such theory of education were asked to epitomize it, he might answer somewhat as follows: The expanding body of knowledge has already reached such proportions that an attempt by an individual to cover it is hopeless. Therefore, a better procedure might be to select carefully and coherently from racial experience a basic body of knowledge and skills which would serve as tools and back-

ground for whatever kinds of learning one might need to acquire. Using this carefully selected body of facts, concepts, skills, experiences, which would probably constitute the main load of early education, the learner would then test and enlarge his abilities through a rather thorough learning of some sample fields. The essence of such a theory of education is that it is the function of the school to help the pupil learn how to learn; that, beyond the acquiring of basic knowledge and concepts, the purpose of the school is to provide some excellent samples of learning experience in a number of fields and extending over the usual number of years devoted to general education. On completion of such a period of education, the graduate might say, "There are many things I do not know and many skills I do not have, but I know how to get them, I know how to learn what needs to be learned." This concept is the opposite from blueprinting and stereotyping the education of a child. It aims at giving him versatility and independence.

Now, supposing one held some such theory of education as has just been described, in what kind of a psychology of learning would he be most interested? Obviously, the crucial psychological problem for such a theory is that of transfer. How can the learning attained carry over and spread to other situations as they are encountered? How can the outcomes of education be generalized so as to be broad in scope? Certainly the early types of experiments on transfer, such as Thorndike's study of the effect of practice in judging the size of circles upon ability to judge the size of squares, would contribute little. The problem could not be met by studying the carry-over of one academic subject to another subject. Rather, the studies that have significance are those that deal with transfer at the general rather than the specific level; with the development of intellectual habits that may spread widely, rather than with narrow intellectual functions. Studies such as Harlow's experiments with chimpanzees in learning how to learn have high significance for such a theory of education, and they would have still higher significance if carried on with human subjects where the possession of language enhances the possibilities of transferring training.

The concept of transfer in learning how to learn applies both to subject-matter and to method and technique. The understanding embodied in the arithmetical generalization that "when both the numerator and denominator of a fraction are multiplied by the same number, the value of the fraction is not changed" is more

transferable than the specific fact that two-thirds and four-sixths have equivalent value. Likewise, the acquisition of general techniques, such as how to use a library card catalogue, is of more general value than to learn the location on the shelves of a specific reference. The essential test of any theory of education is its transfer value, yet the design of most of our learning experiments dealing with transfer is feeble compared to the size of the problem to be studied.

The crux of my contention is that educational psychologists have been loath to strike out independently in solving problems in their own field. In the main, our problems deal with education in schools, with human subjects, and with higher mental processes involving language. Without the slightest criticism of experiments in general psychology, we cannot continue to be satisfied with implications for education from results of experiments with simple mental processes, with animals, and at the sub-language level. This past summer, parents of children from coast to coast were aroused by a recent book denouncing current methods of learning how to read and proposing that the schools go back to an earlier phonetic method as the sole way of learning to read. The answer to the place of phonics in learning to read will never come from animal experiments nor from the use of nonsense syllables. Nor will it come from half of the educational experiments on phonics which measure only the effect on the ability to pronounce words. If by reading one means the ability to get meaning from a printed page, there is little experimental evidence one way or the other at the present time regarding the value of phonics. The field of reading has without doubt been subjected to more careful research than any other area of learning in the school, yet here in the case of phonics is a prime example of an opportunity passed by to do research on an important transferable function.

I am proposing that educational psychologists take their cues for research from problems of learning in schools, where the processes are complex and where the learnings carried on are at the language level. May I try to indicate what, to me, seem to be three very fruitful fields for research.

I would suggest, first, research on the success, or lack of it, in teaching students how to think. For some years our schools, particularly at the high school and college level, have proclaimed this as one of their main objectives. Yet, a critical appraisal of avail-

able research on this problem gives little evidence that schools are accomplishing their objective. When allowance is made for constantly increasing mental maturity, and when pertinent variables are controlled, it is difficult to find evidence of any marked gains in ability to think due to the work of the schools. Our claims far outrun the evidence. Is it possible to learn how to think more effectively, or are the methods of the school wrong? There is plenty of evidence that students can learn to think within the area of the subject-matter being taught, but the real issue is whether or not they can transfer the ability to other areas. For example, in a study of problem-solving last year, we found that in one group of sixty-one college students, all of whom had had a course in algebra, only twenty of the sixty-one attempted to use algebra in solving a problem where the algebraic method was the most economical way to solution, and, of the twenty who attempted to use algebra, only one succeeded in getting the correct answer. Algebra had apparently failed to contribute a method of thinking to these students. Or, to illustrate further, it is probably true that most students, and some teachers, fail to sense that the high school course in geometry is in essence a course in deductive logical thinking, using space figures as the medium of operation. Rather, geometry is usually taught as a body of content, the learning of which is a sufficient outcome in itself. Here is a major problem in learning at the abstract language level, yet the bulk of the experimentation on it is with animals and at the sub-language level. Why do we so generally avoid experimenting on problem-solving with human subjects and in school situations where the real issues are?

I would suggest that a second area of research intimately related to current educational theory is in the learning of personality characteristics. The school expects its pupils to learn to be accurate, to carry responsibility, to be critical, to have good personal relations with others, and many more such traits. Here, clearly, is a problem in transfer of learning. Most schools deal with this problem of personal-social education in a loose, incidental manner. Whereas the school has a definite and coherent methodology, supported by a considerable body of research, for learning to read and to do arithmetic, there is little experimental evidence to guide the school in its program of personal-social education. In a widely used book on the subject, there is a bibliography of more than eleven hundred references dealing with personality; but less than

a dozen of them report studies of learning personal-social traits in the schools. Admittedly, experimentation in schools is difficult, but can we not design studies with sufficient controls to take account of the difficulties?

Last, I would suggest the problem of motivation in school as of high importance for educational psychologists. Here, clearly, we are in difficulty if we rely on implications from studies of animal learning. In most animal studies, the motivation for behavior is hunger or punishment. Such incentives, obviously, are not applicable in the schools. In fact, the whole concept of tissue needs has little force for school learning. Most of the interests and motives that operate in the schools are learned, and it may well be that one of the main contributions of the school is to modify, through learning, the motivation that operates within the learner. If, for example, the school could succeed in making students intellectually curious, the operation of such a motive might have a broader effect than the mastery of any specific segment of subject-matter. The problem is, how and why do some students learn to be intellectually curious while others do not.

The three problems for research just suggested, namely, learning how to think, learning personal-social traits, and learning motivations, are not matters of great concern to a "Knowledge is Power" type of educational theory. However, to a theory of education based on the concept that the essence of education is learning how to learn, such problems are at the heart of the matter. With such a theory, the main concern is to find what curricular content and what intellectual tools are essential to carry on the kind of learning desired, and then, in turn, to what scope of subject-matter and to what depth and thoroughness should the school go in order to be sure that the student will be independent and versatile, and will feel confident that he knows how to learn as new occasions may require.

Educational psychologists must first of all be psychologists; there is no substitute for competence in the basic subject. But their field of operation is education and, in the main, is concerned with the schools which are society's principal agent for providing education. The main business of the school is learning, and psychologists should have something to say about learning. Whether what they say is understood and is useful to the school depends a great deal on whether or not the psychologist understands theories of educa-

tion as well as theories of learning, and whether his research deals with problems which are important to the educational theory of the time or whether it deals with yesterday's issues. This dual rôle of the educational psychologist is not easy, but it is necessary.

The proposal of this paper in no sense suggests that educational psychologists do only applied research and leave basic research to the general psychologist. But basic research need not be restricted to simple mental processes, nor to subjects at the sub-language level. Basic study of motivation can deal with learned motives as well as physiological needs. Studies of transfer can deal with situations that operate through generalizations that are expressed in language symbols as well as with mazes and puzzle boxes. The designs of research will have to be more complex, but they can be made so. If educational psychologists can play their rôle at this higher level of research, they will be able to contribute significantly to the validation of educational theory.

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COLLEGE TEACHING ABILITY, SCHOLARLY ACTIVITY AND PERSONALITY

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The studies here described were begun out of skepticism with the common tendency to dichotomize teaching and research (or creating), as if they were different, antagonistic, and mutually exclusive, and as if a professor had to be a teacher *or* a researcher. The question we tried to answer was, "Is creativeness (research, activity in the field, writing) in a college teacher positively or negatively correlated with goodness of teaching?" This amounts to asking, "Is the good college teacher more apt or less apt to be active also in his chosen field?"

This research was carried through by the senior author at a large municipal college with very high intellectual and academic standards during the years 1943–1946. Both students and faculty members were used, the former for rating their instructors, the latter for rating colleagues in their own department. Students were asked to list all the courses they had taken up to the date of rating, as well as the instructors teaching those courses. They were then instructed to rate each instructor first "as a teacher" and then "as a personality," defining these terms in their own way. Ratings ranged from +2 for "very good" to −2 for "very poor." The form on which this information was recorded also asked for the student rater's sex, age, class, major subject, and minor subject, but not his name. The raters were assured that these inquiries were being made for research purposes only, and that the data would never be seen by anyone but the experimenter until published in impersonal form.

Faculty members were given a list of their department colleagues, along with a detailed and carefully prepared instruction sheet. Approximately an hour was spent in individual discussion with each rater, explaining the purposes of the research, allaying suspicion, making guarantees, repeating instructions, etc. The faculty raters were asked to rate each of their colleagues as "teachers," as "personalities," and for "creativeness in the field."

The complete instructions, can be briefly characterized as fol-

lows:

A person deserving the highest possible rating, as a teacher, was described as one who is both capable and efficient, who loves his job and manages to inspire his students, who is himself inspired with his work, who is talented, and who not only respects and appreciates his students, but also has good relations with them. The highest rating as a personality was to be given to a very healthy, well integrated person, subjectively at ease with himself, happy or content, using all his constructive capacities, enjoying life without neurotic or psychotic maladjustment. Creativeness was described as aliveness and activity in the chosen field of knowledge, having ideas, continuing to learn and to study, producing something in terms of publications, artistic contributions, or inventions.

Rating data were included for analysis if a teacher was rated by at least three colleagues (median number 3.5), and if the number of teachers so rated constituted a majority in the department. Not less than eleven students rated each of these teachers (median number 35). Complete data were collected on eighty-six teachers who comprised better than sixty percent of the faculty in the following departments of the College: Biology, Chemistry, Mathematics, Psychology, Political Science, and Speech.

Estimated reliabilities of the ratings are listed in Table I, while intercorrelations among the five ratings are listed in Table II.

The pattern of the intercorrelations shows the two student ratings, "as a teacher" and "as a personality" holding together, and the two colleague ratings, "as a teacher" and "for creativeness" doing likewise. At the same time, students and colleagues agree unexpectedly well in their ratings "as a teacher," but the colleague rating "as a personality" stands apart from all other ratings by either colleagues or students. This clustering becomes clearly apparent in a rough factor-analytic approximation.[1]

[1] Centroid method with rotation to simple structure and positive manifold, yielding the following factor loadings:

Teacher's rating of colleagues "as a teacher."	0.71	0.44	0.40	0.85
Teacher's rating of colleagues "as a personality."	0.34	0.13	0.66	0.57
Teacher's rating of colleagues "for creativeness."	0.77	0.25	0.35	0.77
Student's rating of teachers "as a teacher."	0.10	0.77	0.45	0.80
Student's rating of teachers "as a personality."	0.30	0.82	0.12	0.77

TABLE I—RELIABILITIES* OF THE RATINGS
(N = 86)

Rating	Estimated Reliability	Estimated Reliability Corrected	Standard Error of the Estimated Reliability Coefficient
Teacher's ratings of colleagues "as a teacher"	0.61	0.85	0.040
Teacher's ratings of colleagues "as a personality"	0.47	0.77	0.049
Teacher's ratings of colleagues "for creativeness"	0.63	0.86	0.038
Student's ratings of teachers "as a teacher"	0.77	0.96	0.044
Student's ratings of teachers "as a personality"	0.70	0.94	0.055

* Ratings of a teacher submitted by three colleagues chosen at random were plotted in pairs and correlated, while the averages of five student raters chosen at random were correlated with the averages of a second five chosen at random. Coefficients so obtained were corrected by entering the ratio of the number of ratings averaged to the median number of raters in the Spearman-Brown prophecy formula.

Thus, on the basis of the data presented, it can be concluded that, at least in the college where the ratings were obtained, colleagues tend to equate good teaching with creativeness, and students tend to equate good teaching with good personality. Also, students and faculty agree fairly well on who the good teachers are, but their conception of personality is quite different. In fact, the faculty conception of personality is relatively independent of all of the other rated traits.

This study is open to criticism on several counts. In the first place, ratings are subjective evaluations at best. Moreover, two populations were used as raters, one of which was instructed in detail while the other was given minimal instructions.[2] Also, the detailed instructions given to one group of raters were so worded as to introduce automatically a certain amount of overlap. These facts are regrettable; yet, some of the findings may be seen as even more remarkable in this light.

[2] The two sets of rating data were originally gathered separately. The decision to combine them was made later when it appeared that, despite inconsistencies, useful conclusions might be drawn from the comparisons.

TABLE II—INTERCORRELATIONS* OF THE RATINGS
(N = 86)

Variables Correlated	r	Standard Error of r
Colleague's ratings "as a teacher" vs. colleague's ratings "as a personality"	0.58	0.072
Colleague's ratings "as a teacher" vs. colleague's ratings "for creativeness"	0.77	0.044
Colleague's ratings "as a teacher" vs. student's ratings "as a teacher"	0.69	0.057
Colleague's rating "as a teacher" vs. student's rating "as a personality"	0.59	0.071
Colleague's rating "as a personality" vs. colleague's rating "for creativeness"	0.51	0.080
Colleague's rating "as a personality" vs. student's rating "as a teacher"	0.29	0.099
Colleague's rating "as a personality" vs. student's rating "as a personality"	0.40	0.091
Colleague's rating "for creativeness" vs. student's rating "as a teacher"	0.51	0.080
Colleague's rating "for creativeness" vs. student's rating "as a personality"	0.41	0.091
Student's rating "as a teacher" vs. student's rating "as a personality"	0.76	0.046

* Pearson product moment coefficients were computed. Distributions were markedly skewed with too few raw score categories for normalizing, but the correlation plots showed linear regressions. The skewness was attributed to faulty measuring scales, rather than to non-normal population distributions.

It would seem that if the high relationship between two of the colleague ratings was due primarily to the operation of a halo effect in rating, or to overlap introduced by the instructions, the third colleague rating would be equally affected. Yet it stood well apart from the others. Also, if the two rater populations received different rating instructions, the intercorrelations between ratings by the two populations would be expected to be lowered. But the correlation between their ratings "as a teacher" was quite substantial. These facts seem to strengthen rather than weaken the conclusions drawn above.

It is not claimed that these results would necessarily obtain in other institutions. Brooklyn College is unusual in two respects that help to create these results. First, its students are homogeneously

excellent and serious. They take their teachers and courses very seriously, and are apt to feel swindled rather than relieved by an empty course. Though, like other students, they may choose instructors who are popular, entertaining, or well liked, they do not necessarily respect them as teachers. Second, the faculty of this college is very heterogeneous, ranging from excellent to incompetent. The senior author's personal judgment is that the best twenty-five per cent would grace any faculty in the country, but that the poorest twenty-five per cent have no real usefulness to the college, since their ability and intelligence are probably less than that of most of their students.

A faculty which is homogeneously good (or homogeneously bad) undoubtedly would show lower correlations between teaching ability and creativeness. Our findings would be much less striking in such a faculty. In addition, we should expect student ratings of their teachers to be useful only when the students were earnest and serious intellectually.

Finally we may say a word about the validity of student judgments of their teachers. These correlate so well ($r = 0.69$) with faculty judgments of these same teachers that a faculty cannot take student judgment lightly without casting aspersions on its own competence to judge.

BOOK REVIEWS

HELEN D. SARGENT. *The Insight Test* (a Verbal Projective Test for Personality Study). The Menninger Clinical Monograph Series, No. 10. New York: Grune and Stratton, 1953. $6.75

Helen Sargent's book is essentially a technical manual for use with a new projective device, the Insight Test. The Insight Test should be of interest to clinical psychologists who wish to add to their armament one more weapon for attacking the ego structure of their clients. However, the book and test will be of little value to psychologists or educators who are not already thoroughly familiar with dynamic psychology and the theory and practice of projective techniques.

Sargent is modest in her claims for the Insight Test and suggests that it be used as a supplement to, rather than a substitute for, the widely used projective tests such as the Rorschach method and the Thematic Apperception Test. Furthermore, she insists that her test is still in an experimental stage and can, thus, be used only with caution by persons well trained in clinical psychology.

Although Sargent's Insight Test has a number of characteristics in common with well-known projective tests, it differs from them in its stimulus material, scoring system, and interpretation.

The stimulus material is a series of verbal items called "armatures," a term derived from the flexible frames or skeletons on which an artist constructs his models. These armatures give the bare outlines of a problem situation, and the subject responds by telling what the leading character did, and why, and how he felt about it. The rationale for labeling this task "The Insight Test" is that the subject is, ostensibly, asked to show insight into the behavior of others. Actually, of course, it is the clinician who hopes to gain 'insight" into the ego structure of the subject.

A large part of the book is devoted to the fairly complex scoring system and to illustrative protocols. The author claims that, although the scoring system appears complex and time-consuming at first, it can be easily learned and need not take more than thirty or forty-five minutes per record, as a rule. Even so, this represents an expenditure of time and effort that the busy clinician may be reluctant to spend on a new and still frankly experimental test, especially when he is told that the Insight Test is best used as a

supplement to such time-consumers as the Rorschach and T.A.T.

Interpretation of the test, once scored, may follow quantitative or qualitative data derived from the protocols and will vary to some extent with the particular clinician using the test. However, Sargent's orientation is psychoanalytical, in a broad sense, with emphasis on ego psychology and dynamic theories of personality. A formal analysis is used with the Insight Test, and the interpretation is concerned with effect and thought processes that can be observed in the solution of "armature" problems.

The problems of reliability and validity, in any traditional sense, are always hard to cope with in a projective test for the study of personality. Sargent reports some predictive studies are in progress, but there is little "validity" data. She reports fair agreement on interpretation between users of the test and talks at some length about "intrinsic validity".

Reception of the Insight Test will depend upon the sympathies or antipathies of the psychologist reviewing or employing the test. To a clinician who is sympathetic to projective testing and who is willing to do a good deal of work and experimentation himself, Sargent's book will prove to be worthwhile reading. To the psychologist who is concerned largely with normal or non-pathological behavior or who has reservations regarding projective psychology, the book will be read, if at all, with skepticism. What is needed now is more research evaluating the predictive usefulness of the Insight Test in diagnosis and therapy.

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EDWARD PODOLSKY, Editor. *Music Therapy*. Philosophical Library. New York: 1954, pp. 335.

Music Therapy, edited by Edward Podolsky, contains thirty-two articles by thirty-nine contributors on almost every phase of music as related to mental health and therapy that can be considered. The articles could be grouped into three large sections: a series of articles on the general value of musical therapy and the history of it; the effect of music on moods and temperament; and, another series, a larger series, on musical therapy in specific assignments—for example, the use of music on psychotic patients, the use of it as an adjunct on electroshock therapy, the use of it in anxiety states and depression, tension headaches, psychopathic personality,

gastric disorders, high blood pressure, the heart, and, to be up to date, it has a chapter on music in military medicine. Also, as a sign of modernity, it has a small article on high fidelity in music therapy. In general, the articles are written on a descriptive or vague generalized level. Relatively little objective data are given, although some of the programs used in some of the institutions are described and some of the results in general terms given. A fair number of these articles were previously published in about fourteen periodicals listed and acknowledged. There is very little editing done.

The articles do not hang together; they are not arranged in any orderly fashion; they are just a series of relatively small articles—typically, by one person, every once in a while by three or four. There are some objective data in a few of the articles; for example, in The Effects of Personal Insecurity on Reactions to Unfamiliar Music, some simple data are presented and generalized from. The last article by Pepinsky does at least suggest limitations of research in music therapy, but even this is on the vague level. It starts off by again referring to the fact that the Bible makes more than casual mention of the use of music as therapy, ends with the advocacy of the use of Lloyd Morgan's Canon, and refers to the dilemma which confronts the researcher in music therapy who finds himself either doing clinical observing without controlled experimentation or attempting basic research without consideration of the interaction of the total personality and the environment of the patient.

Musical therapy is a reality. The description of the use of it in a number of the articles included in this book would be of interest and value to people who are in position to use it, but, as far as objective research is concerned, based on any kind of experimental design that is realistic and discriminating, the beginnings are still to be made. But the volume as is—sketchy articles by a large number of contributors about a large variety of subjects with plenty of overlapping and generalized references—does contain material of value for people in a position to use music as therapy in institutional work or in other situations which permit it. The book contains a bibliography but no index.

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